

## CLAIMS

We claim:

1. A method of detecting target analytes in a sample comprising:
  - a) providing an array comprising a plurality of electrodes, at least one of which comprises an assay complex comprising:
    - i) a capture binding ligand covalently attached to said electrode;
    - ii) a target analyte; and
    - iii) an electron transfer moiety;
  - b) applying a first input signal to said assay complex;
  - c) receiving an output signal;
  - d) processing said output signal to detect the presence of said target analytes.
2. A method according to claim 1 wherein said processing comprises higher harmonic analysis.
3. A method according to claim 1 wherein said processing comprises a fast Fourier transform (FFT) analysis.
4. A method according to claim 1 wherein said processing comprises JTFT.
5. A method according to claim 1 wherein said processing comprises the use of a peak recognition scheme.
6. A method according to claim 1 wherein said processing comprises a digital filter.
7. A method according to claim 1 wherein said processing comprises signal averaging.
8. A method according to claim 1 wherein said processing comprises spectral analysis.
9. A method according to claim 1 wherein said processing comprises peak recognition.
10. A method of detecting target analytes in a sample comprising:
  - a) providing an array comprising a plurality of electrodes, at least one of which comprises an assay complex comprising:
    - i) a capture binding ligand covalently attached to said electrode;
    - ii) a target analyte; and

- iii) an electron transfer moiety;
- b) applying a first input signal to said assay complex, wherein said input signal comprises the sum of multiple frequencies at a plurality of amplitudes;
- c) receiving an output signal;
- d) processing said output signal to detect the presence of said target analytes.

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